

# **FLOOR LOAD SURVEY**

**FEDERAL BUILDING  
517 Gold Avenue, SW  
Albuquerque, New Mexico**

**BPLW Project Number: 91062.009**

**DECEMBER 23, 1992**

**BPLW**



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Architects & Engineers, Inc.

Albuquerque, New Mexico

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## **INTRODUCTION:**

The purpose of this report is to present and explain the loading conditions that exist at the Federal Building, 517 Gold Avenue, SW, in Albuquerque, New Mexico, and to provide recommendations for the relocation or removal of any equipment that may be causing an overload condition for the floor slabs.

This building was built in 1957 and is constructed of a cast-in-place concrete column and two-way floor slab system. It is an eight story building approximately 300 feet long and 100 feet wide with 25 foot structural bays. The building is owned by the General Services Administration and houses many different tenants including the United States Forest Service, the Internal Revenue Service, and the Soil Conservation Service.

Several different floor capacity studies have been performed on a number of individual rooms in the Federal Building. These studies revealed some discrepancies or omissions in the original contract documents that raised questions as to the strength of the concrete and the reinforcing that, in turn, raised questions as to the actual floor capacity. These studies also revealed some obviously extreme floor deflections. Therefore, another study was requested to test the strength of the concrete and reinforcing, to determine the floor capacities of the two-way slab systems based on the results of the material testing, and to survey the deflections of one typical floor. The testing revealed that the concrete strength was only approximately 2100 psi, which meant that the shear capacities of the slabs was nominal on the lower floors and was adequate for only 53 psf on the uppermost floor. This was considerably less than the original 80 psf design live load and only nominal for code-prescribed live loads. The survey of the typical (6th) floor revealed major deflections throughout that floor, including one area with a deflection of 2.88 inches - twice that allowed by code.

This study was requested by GSA to identify unusually heavy loads in the building that could be causing an overload condition and to determine if the deflection problem was widespread throughout the building or if it was limited to only the areas previously studied.

**SCOPE:**

The scope of this study included a walk-through of the entire building with Tracy Graham of GSA to identify any unusually heavy loads that might be causing an overload condition of the slab, to determine the extent of the deflection problem, and to recommend any relocations or removals of equipment necessary to relieve any possible overstressing of the floor slab.

**SITE VISIT:**

The walk-through with Tracy Graham was performed on December 7th and 8th, 1992. Each floor was examined as thoroughly as possible, starting in the northeast corner of the building. The rooms adjacent to the exterior wall were observed on the first lap, and then the interior rooms were observed on the second pass. Observation began on the eighth floor and proceeded, floor by floor, to the first floor.

Each room was inspected for heavy loads and each such load encountered was documented. Major deflections were noted.

OBSERVATIONS:

EIGHTH FLOOR:

- Room 8114 - There is a large gap between the bottom of the hollow metal door frame and the floor which is indicative of floor deflections (Photo 1).
- There are some Sweet's Catalog files approximately 78 inches high leaning about 2 inches from the wall toward the center of the slab.
- A high Lektreiver high density filing system is situated next to the concrete stair shaft (Photo 2).
- Room 8403 - This room contains five 4-drawer flat plan files located in the southwest corner (Photo 3).
- Room 8006 - This room contains a Mosler safe, approximately 24"x30"x30" high (Photo 4).
- Room 8433A- A 4-drawer safe is situated in the corner of this room (Photo 5).
- Room 8437A- This room contains a large radio system located at approximately mid-span of the slab (Photo 6).
- Room 8313 - The gap at the bottom of the door varies from virtually zero inches to over one inch, indicating a large deflection at that point (Photo 7).

SEVENTH FLOOR:

- Room 7412 &  
Room 7021 - This is actually one room with 2 room numbers. The density of the office equipment in this room is such that the live load is probably about 60 psf.
- The southern part of the room contains a Lektreiver Series 80 high density filing system (Photo 8).
- Room 7417 - This room contains a series for flat files, five stacks of two 5-drawer units and one stack of four 5-drawer units (Photo 9). These are situated along an east-west column line.

- Room 7431 - The density of books and equipment in this room is such that the live load is probably about 60 psf.
- Room 7437 - The Spacesaver mobile filing systems in this room were the subjects of a previous study.
- Room 7315 - This room contains several plant specimen cabinets (Photo 10).
- Room 7025 - Four 5-drawer flat files are situated adjacent to the outside corridor wall on the south side of the building (Photo 11).
- Room 7019 - This room contains a large number of bookshelves and flat files (Photos 12 and 13).
  - There is a large crack in the plaster on the south wall of this room extending from the corner of the door to the corner of room along the ceiling and then continuing down the corner to the floor.

#### SIXTH FLOOR:

- Room 6411 - This room contains quite a few bookshelves and cabinets.
- Room 6451 - The ceiling of this room is the original ceiling system, not the typical suspended acoustical tile which was added to the building in most other areas (Photo 14).
- Room 6433 - This room was studied earlier due to the large number of map files. The study recommended that the map files be relocated. This has not been done (Photo 15 - note the floor deflections evidenced by the tops of the map files).

#### FIFTH FLOOR:

- Room 5417 - There are major floor deflections here. Photo 16 shows cabinets leaning due to the floor deflections.
- Room 5033 - Major floor deflections in this room are evident from the tilting of cabinets.
- Room 5449 - This is the U.S. Forest Service Pest Management Library which contains many bookshelves and file cabinets (Photo

17). It appears to be the most heavily loaded room on the fifth floor.

Corridor - Photo 18 shows the floor deflections in the corridor. Such deflections were typical throughout the building.

#### FOURTH FLOOR:

Room 4424 - This room contains a large IBM copier, model number 5360 (Photo 19).

Room 4424A- This is a small storage room off of Room 4424 that contains bookshelves virtually from floor to ceiling.

Room 4408 &  
Room 4412 - This is actually one room with two room numbers. It contains copiers and storage shelves (Photos 20 & 21).  
- There is a classical S-curve floor deflection in this room which is evident from the leaning of the shelves (Photos 22 & 23).

Room 4311 - This room contains a large number of map files and file cabinets (Photos 24 & 25).

Rooms 4015  
& 4015A - These rooms contain a law library and were the subjects of a previous study.

Room 4210 - Photo 26 shows the floor deflections in this room. The board on the wall in the photo is straight and there is nothing wrong with the tables.

#### THIRD FLOOR:

Room 3415 - The slab deflections in this room are evident by the leaning of the cabinets (Photos 27-31).

Room 3301 - This room contains a Mosler safe (Photo 32).

Room 3100 - This room contains a Mosler safe and several file cabinets (Photo 34).

#### SECOND FLOOR:



IRS Office- Floor deflections in this room are evident from the gaps between cabinets (Photo 35).

FIRST FLOOR:

Room 1024 - This room contains a large safe (Photo 36).

### FLOOR SLAB CRACK INVESTIGATION:

Direct observation of the floor slabs is not possible in many areas due to the floor coverings and the original plaster ceiling above the suspended acoustical tile below the slabs. However, there are some areas where the plaster ceiling has been cut away, allowing direct observation of the floor slab.

EIGHTH FLOOR SLAB: - Photos 37 and 38 show cracks in the eighth floor slab. These photos were taken from Room 7021.

FIFTH FLOOR SLAB: - Significant cracks were observed in the fifth floor slab from Room 4210 (Photo 39). A knife blade was inserted approximately 1/8" into one of the cracks.

FOURTH FLOOR SLAB: - Cracks were observed in the fourth floor slab directly under Room 4408 from Room 3404 (Photo 40).

FIRST FLOOR SLAB: - Cracks extending from column to column along column center lines were observed in the "Transformer Room" in the basement.

While the cracks observed were not excessively large, it should be noted that all the cracks observed (with the exception of the first floor cracks) were cracks due to positive moment in the center of the bays. Previous studies indicated that the slabs were stressed to only 50- to 60-percent in these areas. Any cracks in these areas should have been only hairline cracks. The studies showed that it was in the negative moment regions where the slab capacity was nominal. This would indicate that even larger cracks should exist in these regions. However, the cracks would be in the top of the slab and were inaccessible due to the floor coverings.

## CONCLUSIONS:

Major floor deflections exist throughout the entire structure. These deflections were found in both heavily loaded areas and lightly loaded areas. This indicates that the deflections are caused by either previous loading conditions or by the dead loads of the structure itself. The floor deflection are sufficient cause for great concern as to the structural adequacy of the floor slabs. The recommendations of previous studies, especially the recommendations in the report dated November 5, 1992, should be followed.

Most of the loads observed do not appear to be causing an overloaded condition in the floor slab. However, it would be prudent to take the following precautions:

1. Room 7019 - This room is very heavily loaded. The bookshelves and file cabinets in this room should be relocated to areas less heavily loaded. The ideal location for this equipment would be the basement.
2. Room 6433 - A previous study of the floor slab in this room recommended that the map files be rearranged. A diagram of new locations for the map files was provided. This should be done as soon as possible.
3. Rooms 4015 & 4015A - A previous study has also been performed on the floor slabs for these rooms. The study recommended removing some of the bookshelves. This should also be done as soon as possible.
4. Room 1024 - The safe in this room should be relocated to the basement.